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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,770	02/23/2004	Hiroe Kawamura	042138	7652
38834	7590	05/23/2005	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP			ANYA, IGWE U	
1250 CONNECTICUT AVENUE, NW				
SUITE 700			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20036			2891	

DATE MAILED: 05/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/782,770

Applicant(s)

KAWAMURA, HIROE

Examiner

Igwe U. Anya

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 17-28 is/are rejected.
- 7) ☒ Claim(s) 15 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/23/04, 4/12/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 5, 7, 9, 10, 13, 19, 21, 23, 25, 27 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhong et al. (US Patent 5966625).

3. Zhong et al. teach a manufacturing method of a semiconductor device (figs. 1 – 9), comprising the steps of:

forming a silicon substrate with a normal of a surface extending in an inclined direction from a [100] direction (col. 6 lines 50 – 58); and

forming a semiconductor element with a moving direction of carriers being in a [001] direction, on the surface of the silicon substrate (fig. 1);

wherein when an angle of inclination of the normal is decomposed into a component in the [001] direction and a component in a [010] direction, the component in the [001] direction is made within ± 0.2 degrees (col. 6 lines 50 – 58);

said step of forming the semiconductor element comprises the step of reconstituting steps existing on the surface of the silicon substrate by performing thermal treatment (col. 6 lines 59 – 61);

wherein the component in the [001] direction is made within 0.15 degrees (col. 6 lines 50 – 58);

wherein the component in the [001] direction is made within 0.05 degrees (col. 6 lines 50 – 58);

wherein the component in the [010] direction is made within ± 0.5 degrees (col. 6 lines 50 – 58);

wherein in said step of forming the semiconductor element, the thermal treatment is performed in a hydrogen atmosphere, and after said step of reconstituting the steps, an insulation film is formed on the silicon substrate (col. 6 lines 59 – col. 7 line 21);

performing chemical solution cleaning for the surface of the silicon substrate, before said step of performing the thermal treatment in the hydrogen atmosphere (col. 6 lines 53 – 58);

wherein in said step of performing the thermal treatment in the hydrogen atmosphere, a rapid heating and rapid cooling device is used (col. 10 lines 1 – 13);

forming the semiconductor element comprises the step of forming a gate electrode of a MOS transistor on the insulation film (col. 11 lines 15 – 24);

wherein said step of forming the semiconductor element comprises the step of forming a source and a drain so that the moving direction of the carriers in a channel of the MOS transistor is in the (001] direction (col. 4 lines 17 – 22, & fig. 9);

forming the silicon substrate comprises the steps of growing a bulk of single crystal silicon in the [100] direction, and cutting the silicon substrate from the bulk ((col. 6 lines 50 – 58);

wherein in growing the bulk of the single crystal silicon, a Czochralski method is adopted (col. 6 lines 50 – 58); and

forming an element isolation region on the surface of the silicon substrate, before said step of performing the thermal treatment in the hydrogen atmosphere.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 4, 6, 8, 11, 12, 14, 17, 18, 20, 22, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhong et al. (US Patent 5966625 in view of Moritani et al. (US Patent 5833749).

6. Zhong et al. teach the features previously outlined but lack the step of forming an epitaxial layer on the silicon substrate.

7. However, Moritani et al. teach forming an epitaxial layer on a silicon substrate (col. 5 lines 25 – 61) for greater diameter suitable for fabricating compound semiconductor devices (col. 1 lines 20 – 26).

8. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Moritani et al. into the Zhong et al. reference in fabricating compound semiconductor devices.

9. Regarding claims 17 and 18 performing the thermal treatment in the hydrogen atmosphere at a lower pressure than normal pressure is not taught by the references.

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10. However, it would have been obvious to one of ordinary skill to employ any suitable pressure. Where the general conditions of a claim are disclosed in prior art, discovering the optimum or working ranges involves routine skill in the art. In re Aller, 105 USPQ 233.

11. Claims 15 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Igwe U. Anya whose telephone number is (571) 272-1887. The examiner can normally be reached on M - F 8:30am - 5:00pm.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Igwe U. Anya

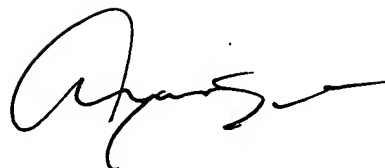
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IA

May 14, 2005

A handwritten signature in black ink, appearing to be "A. J. S.", written in a cursive style.